14

Learning Perspectives of NB HS NPD in PhD Project

This chapter presents the learning perspectives of the project and offers suggestions for further research. The presentation will be divided into three main parts. Firstly, parts referring to the learning which can be drawn from the project on NB HS NPD will be presented. This part will also include the contribution to theory which the research project claimed to make. Secondly, a suggestion for further research was made stressing the further research which had already been established together with the research which should be established for the future after 2003. Finally, a part dealing with the learning perspectives for me as a researcher will be presented.

14.1 Introduction

On the basis of the research project this chapter will present the learning perspectives of the project and will offer suggestions for further research. The learning perspectives will be divided into learning perspectives:

1. on NB HS NPD
2. for the author in particular

The proposal for further research will be given both with a general focus on the Centre of Industrial Production and with a specific focus on my own work as a future researcher.

14.1.1 Learning Perspectives on NB HS NPD

The research project verified that NB HS NPD was just at its beginning in 2003 and that there were more potentials to NB HS NPD than the researchers and the industry use and know about today. From my research on NB HS NPD the following picture of the present situation of speed related to cost in product development could be drawn:

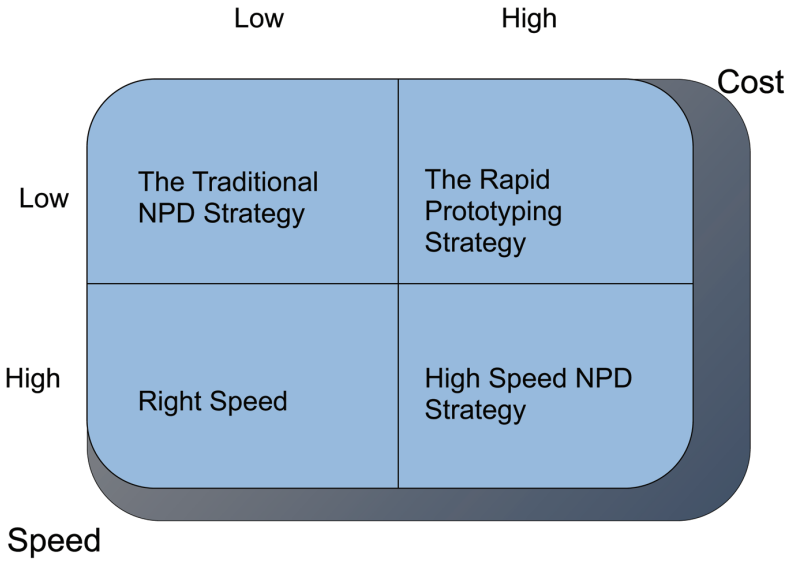

Figure 14.1 Speed and NPD strategy.

The research project verified that businesses could be placed in four generic areas of NB NPD strategies related to speed and cost in product development as shown in Figure 14.1. The characteristics of these generic types can be seen in Table 14.1.

The Traditional Business

The traditional business used same process and models to develop all their products. They did not pay much attention to speed in product development. They decided from an inside out perspective when it was appropriate to introduce new products.

The Rapid Prototyper

The research project verified that some businesses in the research proved to be placed in "the rapid prototype" area. They did not wish to develop products at a higher speed because they felt that they were developing as fast they could and would like to. However, the decision on speed was not related to strategic decisions on which speed was optimal to the product development activity or to the amount of costs and values of developing new products with rapid prototyping.

Table 14.1 Types of NB HS NPD

Types of NB HS NPD	Characteristics	Success Criteria	Product Development Models	Characteristics Related to Speed	Case Examples
The traditional	Tries to gain HS by parallel and simultaneous product development activities. Has a lot of informal processes going on in the business	Cost, speed, performance and short term success criteria	Stage-gate model or Flexible models	Feels its impossible to speed the process further	Ansager NEG Micon
The rapid prototyper	Tries to gain HS by jumping over some stage- and gates	Speed, direct cost.	Stage-gate models or Rapid prototyping or no formal proto development model	Feels they are developing at the maximum speed possible	Scanio, AKV
The high speeder	Tries to gain HS by using a somewhat alternative very flexible way of developing new products. Very much team oriented and plays with the HRM and Management enabler.	Speed, performance, continuous improvement and to some extent learning	Stage-gate model or alternative model	Do not see any reason to why they cant speed product development more.	GSI Lumonics
The right speed developer	The business focus on the product as an process	Focus on Perceived value direct and alternative cost and value. Focus on long term success criteria. Focus on knowledge of NB RS NPD.	All types of product development models, a optimal mix of HS enablers	Focus on right speed. This means that when necessary then high speed and when not slow speed. The main focus is to enter the market at the right time and harvest maximum of the market	Zara, Ryan Air, Nike

The Alternative Business

The research project verified that very few businesses in the research were placed in the alternative product developer area. Only one business was verified to be situated in this area. However, I advance the hypothesis that there were more businesses in this area. The businesses develop fast but with some alternative methods to product development. The businesses saw physical and physiological "walls" to speeding product development further. However, the alternative methods helped them to gain maximum speed. Still, whether maximum speed was the optimal right speed of the product development activities, was not being deliberated. Learning and the long-term success criteria in general were not strategically put into focus.

The Right Speeder

The empirical part of my research could not verify that some businesses were placed in "the right speed product developer" area. In the secondary case area we could verify that a few businesses were placed in the area or were moving into the area of "the right speed developer". These businesses develop products fast but always at a speed that matches the demands on the field of product development. The businesses had a strong focus on long-term success criteria and a strong focus on product development leadership. The businesses did not see a physical or a physiological "wall" to speeding product development further on. They continuously seek to develop the right speed in product development. This involved the continuous search for new products, new improvements to the product development process, and particularly new knowledge and learning from network partners. The businesses had or were moving into an area of strong competitive advantage or what could be defined as a core competence of right speed product development.

The businesses were focused on both direct, perceived and alterative, perceived value. The businesses were focusing on the way in which their customers defined and perceived value.

These businesses were focusing almost exclusively on perceived value based on exhaustive market analyses and on an "outside in" perspective. The businesses were also focused on costs, both direct and alternative costs. The research verified that the alternative costs were often worth more than the direct costs. However, only a few businesses had the tools to manage and measure these alternative costs.

This prevented many businesses from gaining real competitive advantage in NB HS PD. Figure 14.2 illustrates the four types of NB HS NPD businesses.

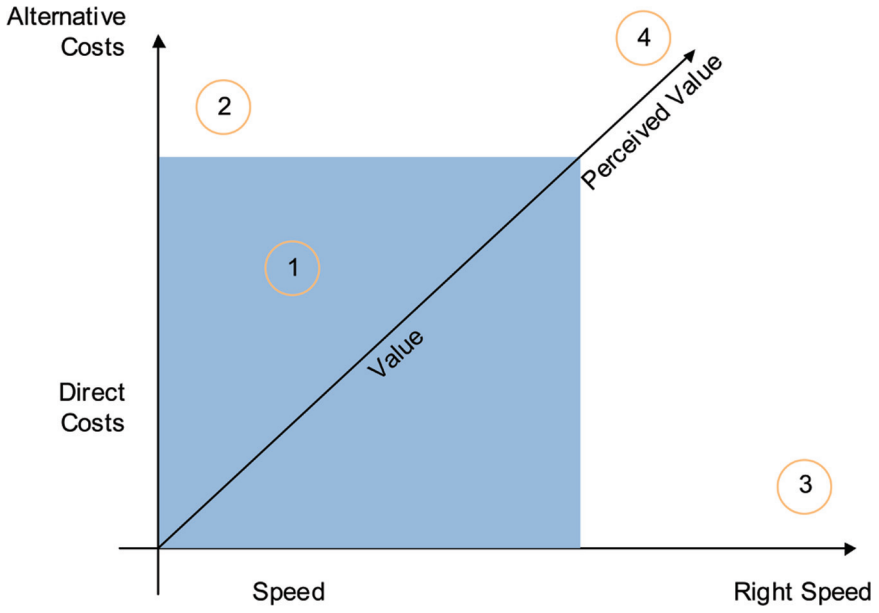

Figure 14.2 Measurement of success criteria in NPD.

The research verified that most businesses were placed in the traditional product developer position where businesses focused on direct costs, value and high speed. It was also verified that there was still a long way to go for the businesses to reach level 4. Also researchers had to do much research to find ways to reach level 4.

14.1.2 Strategic Importance and NB RS NPD

The research showed that a product development process which was vital or had major strategic importance to the business would normally compel the business to use the stage-gate model. The result of the research project verified that the stage-gate model was not always the most effective product development model when focusing on speed and time. However, the stage-gate model was the most used product development model in SMEs.

Therefore, both in general and specific terms it was verified that the product development activities of the businesses did not always follow the optimum line for speed – and especially for right speed – in product development.

Furthermore, it was verified that the stage-gate models generate informal product development models and processes which influence the alternative

costs, value and perceived value of the product development projects of the businesses.

The strategic importance of right speed in product development seemed to increase in these years. Firstly, because businesses who were able to develop products at right speed can:

- harvest the major part of the market with a first mover action or activity
- harvest the most profitable part of the market when entering at the right time
- gain continuously increasing long-term competitive advantage and develop core competences on right speed product development by continuously taking the best and major part of the market

When a new product development was of major strategic importance to the business, a short-term high speed action would not bring the business nearer to long-term success criteria or to sustainable competitive advantage. Therefore it seemed important to businesses to start a movement towards new product development models and towards new focus on managing the product development activities of the businesses.

14.1.3 Speed and Time Related to PD

The PhD project showed that a definition of speed and time in relation to NB HS PD was far more complicated than it seemed at the beginning of this thesis. Original and traditional definitions had related speed and time to the physical time. Until now, businesses and researchers had related speed and time in product development to the physical time it toke for a product to be developed from the idea was born to the product was developed to the market $(\mathrm{t0}-\mathrm{t1})$.

In the research I verified that time and speed must be considered in terms of relative time. Time and speed must be related to the task of the product development activity and to the field of product development. It was verified that the view of time and speed differs quite dramatically depending on whether it is seen from the point of view of the market, the technology, the network, or the business.

The PhD project showed that the classic view in SMEs on time was a much too narrow view on time and speed in PD. Firstly, it had to be stated that there was a time before and a time after $(\mathrm{t}-1-\mathrm{t}+1)$ the product development project.

The time before and the time after the beginning and end of the product development project was very difficult to determine according to the empirical

data of my research. When this was the case, time and speed became floating and fuzzy concepts and it was definitely a question whether it was relevant to use the term of physical time as a measurement of NB HS NPD. I claimed in my research that it was not relevant to measure product development within physical time. The PhD project verified that it was relevant to define time and speed within terms of relative time and speed and within the business optimal point of entry to the business.

The business optimal point of entry is relative to each business dependent on the product development task and the characteristics of the field of product development.

Different Types of Speed

During my case and survey research I had observed different types of speed in NB HS NPD. The different types of speed are shown in Table 14.2.

Table 14.2 Types of speed

Types of Speed	Characteristics
Idea – speed	The ability to speed new ideas coming to be absorbed by the product development process of the business
Idea to market introduction speed – "time to market speed"	The ability to speed the NPD project from idea to market introduction
Stage- and gates speed	The ability to speed the single stages and gates within the product development project
Transfer speed	Speed from one stage to another gate
Complex speed	The ability to speed complex NPD projects
Concurrent speed	The ability to speed several NPD projects at the same time
Market speed	The ability to speed incremental NPD on the market

Until 2003 there were only fragmented knowledge and research on the speed types appropriate in different situations of product development and on the businesses' use of the speed types. Learning had to be established in all areas of product development to investigate the types of speed and to find normative models of right speed in NB NPD. This became of major interest in my future research after 2003.

Right Speed in Network Based Product Development

The research project verified that right speed in product development has to be learned. The critical issue before talking about speed in product development is the ability of the management to:

1. Define the task of product development (radical or incremental)
2. Analyse "the game of product development" or "the field of product development"
3. Learn from one product development project to another
4. Learn across networks
5. Transfer knowledge both vertically and horizontally within the network based product development organisation

Even more critical is the ability of the product development managers to learn through the product development process continuously both vertically and horizontally. The last learning area concerns the continuous learning process in all stages of the product development process – before the formal product development process – from idea to market introduction but also the time after market introduction.

This became a focus for a EU research project at the CIP centre after 2003.

In my research project I claimed that high speed and diminishing physical time in product development was not the issue because of a number of factors:

- High speed focus only on costs and direct costs
- High speed cannot be determined because the end and beginning of a product development project cannot be determined, is not registered in the business or, is very difficult to determine.

Instead, I propose to look at speed and time in product development as right speed and right time. In addition, high speed had a very narrow focus on cost and forgets to focus on value as well. My research verified very clearly that the value both in net profit and in competitive advantage of waiting or speeding for the right time to introduce and launch the product were very high.

Speed Related to Incremental and Radical Product Development

At a previous point in this research I discussed whether a new product can be said to have a beginning and an end. This is very much related to the discussion of incremental and radical product development. The PhD project

showed that most product development was on incremental physical products and very little development is radical product development. At the same time the research verified that the life cycle of products and product development is diminishing dramatically. This meant that the pressure on time increased. The pressure on time was related to the characteristics of the product development task. Many businesses up to 2003 saw major difficulties in speeding the product development process further because the products were physical and because they found themselves stuck in too complicated radical types of product development models and processes.

I therefore claimed that businesses had to change the way they thought about product development to move towards a more agile type of strategic management of product development and of product development models and processes. Businesses had to use more types of product development models to match the need of speed in product development.

I claimed that much more incremental product development could be carried out "on the market" as illustrated in Figure 14.3 and did not

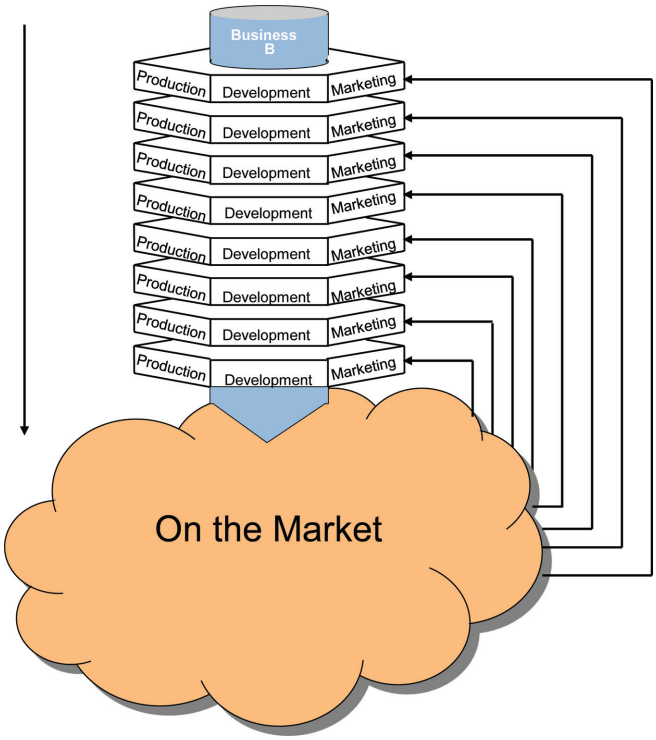

Figure 14.3 On the market product development.

needed to enter a formal product development model or process. Only the radical product development projects should enter a full-scale product development model and process. However, even some radical product development projects needed not to enter a full scale product development model.

The discussion of time becomes interesting but also more complicated when the discussion is extended to encompass a process view turning the definition of the product from a view of understanding the product to a product viewed as a mixture of product and process with no beginning and no end.

I claimed that the process view was necessary to fathom for future discussions on product development in order to allow businesses to gain competitive advantage. The process view was new to the product development theory in 2003 and at the same time very difficult and very poorly introduced to and implemented in the industry. This was particularly stressed in the research empirical part of the research project.

The process view as illustrated in Figure 14.4 puts into perspective especially the focus on the right time to introduce and implement a product on the market. This turned the discussion into a discussion of a dimension of relative time or, more specifically, to find the strategically right time to

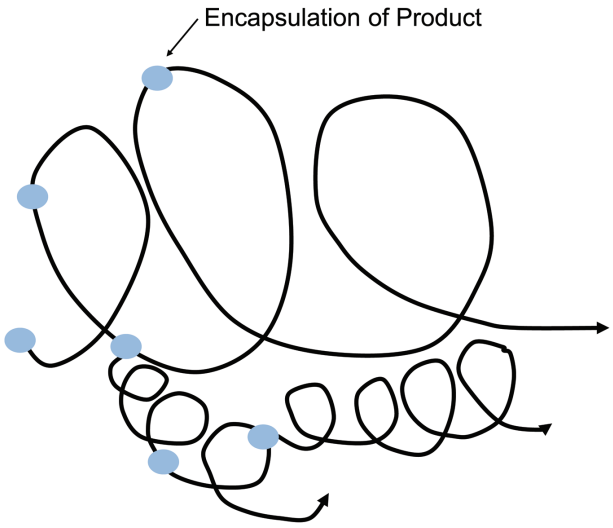

Figure 14.4 Encapsulation of new products in the product development process.

implement a product be it radical or incremental. It stresses the relationship approach where

> *"product development is based on a continuously repeated market transaction and mutual gain where product development strategy and process integrate customers, suppliers, and other network partners into the businesses design, development, manufacturing and sales and marketing process".*

In this case, the concept of right time had to be defined by the network management level of the product development project before a final statement of speed and time to develop a new product could be discussed as illustrated in Figure 14.5. The research project verified that it was impossible to define whether the product development of a business should go fast or slow before the right time of a product development introduction could be defined. The question is if this can even be defined and a process view can be used as a definition of products. I claimed that the right time is "eternal" and that the right time is moving all the time. This became subject for further research after 2003.

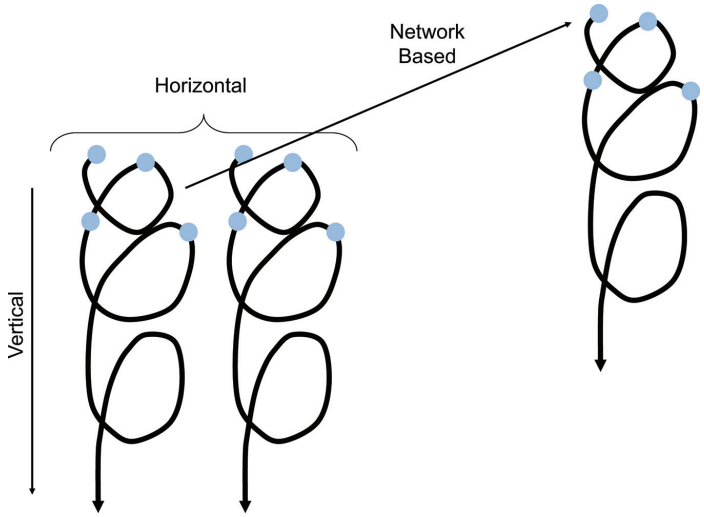

Figure 14.5 Encapsulation of new product across the vertical, horizontal and network based product development process.

Source: Inspired by Svend Hollensen.

14.1.4 When Are Time and Speed Important?

The discussion of time and speed is important and can be discussed on the basis of the following perspectives.

Time, Speed and Characteristics of Markets

The research showed that in case of stable markets and dynamic markets, it could be a preferable to move the product development at a somewhat slower speed. When markets were stable, the net profit of moving product development at high speed would not give the business major competitive advantage although minor, continuously incremental product development was necessary. In markets with dynamic characteristics it was also preferable to move product development at a lower speed because market demands had not yet stabilised or were even not yet present. The pressure on time was therefore not really existent.

On the other hand, markets that were evolving and begin to show signs of standard product market architecture needed to be handled with speed in product development in order for the business to harvest the market before the competitors gain first mover advantage.

Evolving markets should be handled with care and much attention should be paid to the degree of speed of the product development project. A wrong decision on speed was verified to be extremely critical to the business. Speed in an evolving market situation was maybe the most difficult feature for development managers to handle.

Time, Speed and Technology

The research showed that the technological development gave the businesses up to 2003 significant, exciting possibilities. Furthermore, the technology put major pressure on the field of product development and on the businesses to adapt new technological features. Many businesses had fallen victim to this pressure and had experienced first mover bad advantage.

In future after 2003, the businesses had to improve their ability to analyse and decipher when the technology should be adapted to their product. Again, it was a question of right speed in adapting the technological possibilities to the products. I claimed that this decision had to be related to an analysis of the product development task and of the field of product development.

Time, Speed and Network Component

As mentioned above I claimed that the network enabler would be of major importance to the product development of the businesses in the future after 2003. More network activities in known and unknown networks were seen up to 2003. Such networks had a high degree of mixing different network types – physical, digital and virtual. This ability would be necessary to future product development in order to keep up with competition on speed in product development on the global market.

The businesses of 2003 therefore had to put a strategic view on their network activities and involvement and start a strategic process of developing their NB HS NPD. The research verified that the businesses' involvement in network and their use of the network enabler were much too narrow in 2003. The reason was also shown in the fact that the businesses' overview of their network competences was far too restricted. Maybe this was due to the very limited use of the HRM enabler and HRM function in product development.

Time, Speed and PD Competence Component

The product development competences of a business in a stable market needed to be handled with much attention paid to the stabilisation and rationalisation of the competences of the business. It was essential to find specific and necessary competences that matched the particular needs for speed in product development.

Competences in an evolving market had to be handled with care because some competences could be of vital and core competence importance whereas others could be of minor interest seen from a product development perspective.

Therefore it was vital to the business to find the right product development competence architecture. In this way the business could develop and secure future right speed product development. Whether it should be slow or fast speed should be decided in accordance with the evolvement on the field of product development and with the business optimal point of entry. This meant that in some cases it could be preferable to out-source some competences and in others to in-source competences.

When product development competences were dynamic and very fussy and when no core competences were established in a market, it was of major importance to the business – according to the research – that businesses move

at a slower speed in product development. In such cases the businesses should try to focus on finding competences of major importance to the PD project on the global market.

The HRM function could be of use when it came to spotting such competences.

14.1.5 Importance of NB RS NPD Related to Field of PD

The research showed both specific and general examples of the importance of NB RS NPD to SMEs. In general, NB RS NPD was important to all businesses operating in the global markets. We expected in 2003 to see more right speed to product development when products turned to processes, when supply chains were changed to match the new order of right speed in product development and when businesses really began to use and develop the network output in product development. I claimed that 2003's network cooperation in SMEs was only the first generation of NB HS NPD. A lot of businesses would have to change their mission, goals and strategies of their product development activities and even to change their strategic business areas. Furthermore, we would see new types of industry and business models which had never been seen before. Yet, we only knew very little in 2003 about the business possibilities of the new virtual process business areas.

The importance of NB RS NPD to industry seemed to be tremendous. In some cases NB RS NPD could change the whole industry structure. Some cases showed that NB RS NPD could change old, stable, competitive situations. Additionally, it could change market leaders to market followers or could even send the market leaders out of the market. Therefore, NB RS NPD should be handled with care.

In particular the effects of NB RS NPD show directly on the turnover and net profit of the businesses. When businesses succeed in harvesting the actual market continuously because of right speed NB PD, the effects could be tremendous and could be dangerous to businesses if the process was not managed and assessed properly.

It was obvious in 2003 that NB RS NPD could also have a major influence on the production of the businesses because production had to perform a new type of agility in production. Many production lines were designed for mass production today. Such design will fail in situations where NB RS NPD is based on a strong customer enabler – and had to reach out for customisation.

14.1.6 Strength and Weaknesses of NB HS NPD

NB HS NPD seemed not to have any weakness because nearly everybody could agree that if businesses could develop new products in networks continuously and at high speed, this would result in competitive advantage, increased net profit and significant market share. Consequently, this seemed to be the business optimal scenario for a business. However, NB HS NPD also has and had weaknesses.

If NB HS NPD turned out to be made into a routine and when businesses continuously "win the market", then the market will stabilise and products will become standard or very similar. The business will try to focus on costs and will move away from value and perceived value because the market characteristics will change from rather radical innovation, rather dynamic and rather many competitors. The market will begin to show more and more incremental product development at fewer intervals, and a rivalry on price will emerge. I stated this earlier by saying that markets float between stable and dynamic characteristics but NB RS NPD can result in a stable market situation where someone will try to prevent continuous innovation.

This change in characteristics will influence the motivation and the product development work both inside the business and in the network. This situation is very critical to businesses because they can be attacked by competitors who suddenly change the speed of product development and the conditions of market competition. Therefore, the difficult part for managers of product development who want to focus on NB RS NPD is to keep focusing continuously on NB RS NPD. This was, however in 2003, defined as a major scientific issue and a challenge for the future.

Furthermore, if a business dominates NB RS NPD on the market, there will be a tendency to "kill" the good ideas and the entrepreneurs. This can turn out to be critical and can be a weakness both to the business, to the network and to the global market.

NB HS NPD Kills Network

I claimed that NB RFS NPD had to be based on network and network partners. Dependent on this network it is possible to gain the advantage of NB RS NPD. However, as we had mentioned before the network must be based on trust. When the network stabilises or suddenly does not have a product development task, then the network partners will seek other network partners and other tasks. The motivation of the network partners to join other networks and other product development task will increase.

Core Competences Can Slip Out of Network

In the NB RS NPD situation businesses must realise that competences, knowledge and other critical resources are at a potential risk of "slipping" out of the network and being transferred to new networks. It is therefore essential to the business to make a long-time planning on how to join the NB RS NPD. It is also essential to find solutions to what competences and which knowledge the business wants to give as open source, and to which they do not want to give network partners access.

Of course there were and are many other weakness of NB RS NPD but my claim in 2003 was that the major weaknesses were found in the network component. Also the fact that working in networks and specifically in networks that include unknown partners increases the potential of the above-mentioned. Therefore, there was and still is much to learn on how businesses should join NB RS NPD.

14.1.7 Opportunities of NB RS NPD

Through the research I discovered three important competitive advantages when businesses follow a NB RS NPD line of business.

Firstly, as has already been commented on, the businesses can gain the opportunity to "harvest the market at high speed". This will leave the competitors with no or only small parts of the market.

The second important discovery is the possibility for businesses to "play with the money of suppliers and customers". This means that "right speed businesses" barely have to finance their business activities because they are playing with the money of suppliers and customers. In some cases they may even earn money on the financial part of the business transaction which can turn out to be worth more than the primary business – the multi business model approach (Lindgren 2013).

The third important discovery was the observation of the way in which the businesses "played the right HS enablers at the right time". The observation showed that the businesses could save much on costs if they played the right HS enablers. At the same time, the businesses could improve much on value and perceived value.

The PhD project showed that the use of HS enablers to NB HS NPD was very fragmented and different among businesses today. Many businesses focus very single-mindedly on one or two HS enablers shown in this research. Particularly enablers such as 2, 3 and 9 – the modularisation enabler which where the most used HS – were verified in the empirical data. The secondary

cases showed, however, that the businesses used a much higher degree of a mixture of HS enablers along with a much more agile use of HS enablers. Furthermore, the research discovered two new HS enablers – the management enabler and the informal product development model enabler.

The research showed that the use of HS enablers was not founded on a strategic product development plan in the SMEs. This is probably the reason for the above-mentioned fragmented and unstructured use of HS enablers. Furthermore, the SMEs seemed to use the same HS enablers for all product development projects which were verified not to be effective in a right time and right speed perspective. The research project learned that the use of HS enablers should be much more flexible and agile initially, during and after the product development project.

From the research project the flexibility and agility of using the enablers to HS product development were claimed to be very much related to product development leadership (PUL) because it was at the PUL level that the strategic use of HS enablers should be decided. The PUM level should secure the tactical implementation of the HS enablers and the "front-end right speed product development performance".

It was therefore important that the HS enablers were considered together with PUL and PUM in a ongoing process where knowledge was absorbed at the front-end of the product development organisation and transferred to the PUM and PUL level.

14.1.8 High Speed – A Competitive Weapon

The high speed tool in product development was shown to be a strong competitive weapon in 2003. Many businesses used this weapon to stay in business when others used the weapon to press their competitors out of the market by continuous high speed product development. However, it was also discovered that businesses could use the NB HS product development strategy to change the conditions on a market. This meant that the businesses could change their position from market follower to market leader. However, this had to be seen in relation to the characteristics of the "field of product development".

14.1.9 Threats of NB HS NPD

The threats of NB HS NPD had already been stressed in the previous chapters. The main threats could be divided to the following areas:

1. The threat of coming to early to the market
2. The threat of coming to late to the market

However, there was another threat which was more industry related and where many businesses are threatened by new entrants (Porter, 1985) using NB HS NPD.

14.1.10 Demands to NB HS NPD

The research showed major demands to NB HS NPD. The research did not have particular focus on these demands to NB high speed in NPD but some demands were very significant to the researcher. These can be seen in Table 14.3.

14.1.11 Barriers to HS NPD

During the research I observed various barriers to NB HS NPD. The research did not have particular focus on barriers to high speed in NPD but some barriers were very significant to the researcher. These can be seen in Table 14.4.

14.1.12 High Speed and Right Speed

The PhD project verified that businesses today have a strong focus on high speed which is related to costs as illustrated in Figure 14.6.

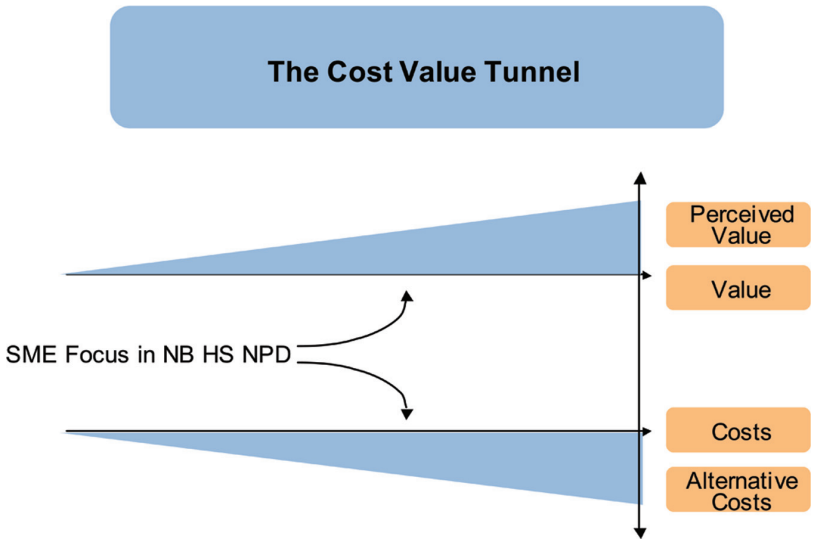

Figure 14.6 Cost value tunnel.

Table 14.3 Demands to NB HS NPD

Demands to NB HS NPD	Literature Search	Case Research	Focus Group Interviews	Survey	Other	Verified
Trust	Yes but in few businesses	Yes but in few businesses and very little	Yes but in few businesses	Yes but in few businesses	Yes	Yes
Motivation	Yes	Yes	Yes	Yes	Yes	Yes
PU model	Yes	Yes – but mainly stage-gate	Yes – mainly stage-gate	Yes – mainly stage-gate	Yes	Yes
The Network partners must be strong	Yes	Yes – but mainly customer and to some extent suppliers Limit networks	Yes – but mainly customers and to some extent suppliers Limit networks	Yes – but mainly customers and to some extent suppliers Limit networks	Yes – but mainly customers and to some extent suppliers Limit networks	Yes
A network culture must be establish in the business	Yes	Yes	Yes	Yes	Yes	Verified
HRM has to play a more active part in PD	No	Yes – but few businesses	Yes – but few businesses and limit efforts	No	Yes – but few businesses and limit efforts	Partly verified
The business must focus on long term relationships	Yes	No	No	No		–
The business must focus on long term success criteria	Yes	To some extent – few businesses and limit efforts	No	To some extent	To some extent	Partly verified

Table 14.4 Barriers to NB HS NPD

Barriers to NB HS NPD	Literature Search	Case Research	Focus Group Interviews	Survey	Other	Verified
No Trust	Yes in few businesses	Yes in few businesses and very little	Yes but in few businesses	Yes but in few businesses	Yes	Yes
Motivation	Yes	Yes	Yes	Yes	Yes	Yes
PU – model	Yes	Yes – but mainly stage-gate	Yes – mainly stage-gate	Yes – mainly stage-gate	Yes	Yes
The Network partners are too weak or not used to NB HS NPD	Yes	Yes – but mainly customer and to some extent suppliers Limit networks	Yes – but mainly customers and to some extent suppliers Limit networks	Yes – but mainly customers and to some extent suppliers Limit networks	Yes – but mainly customers and to some extent suppliers Limit networks	Yes
Culture	Yes	Yes	Yes	Yes	Yes	Verified
HRM is not playing an active part in PD	No	Yes – but few businesses	Yes – but few businesses and limit efforts	No	Yes – but few businesses and limit efforts	Partly verified
The process enabler	Yes	No	No	No		–
The businesses think product instead of process	Yes	To some extent – few businesses and limit efforts	No	To some extent	To some extent	Partly verified
The modularisation enabler	Yes	Yes – but not fulfilled	Yes – but not fulfilled	Yes – but not fulfilled		(+)
E-development is not functioning	Yes – in a few businesses	Yes in very few businesses	Yes but in very few businesses	Yes – but in very few businesses	Yes – but in very few businesses	Partly verified

The research verified that some businesses were reaching in 2003 a limit to HS PD when focusing solely on costs. Businesses had to change their focus and management of NB HS NPD to focus both on costs and value to increase profitability and to achieve right speed.

14.1.13 Short-Term and Long-Term Success Criteria

The research project verified the businesses' strong focus on short-term success criteria and their practically non-existing attention to long-term success criteria. This was very much related to the discussion of product development leadership (PUL) and product development management (PUM). In spite of the encouragement of management literature for business leaders to focus more on leadership, my research project verified that according to product development leaders have far to go in implementing product development leadership (PUL). This lack of focus on PUL seemed to be one of the answers to the strong difficulties of businesses to implement NB HS NPD and also to implement right speed, right cost and right performance product development.

The overall fragmented focus on short term success criteria in the product development of the businesses along with a lack of a strong core in product development projects made it difficult for the businesses to "harvest" the opportunities of NB HS NPD. Furthermore, the above-mentioned did not help the businesses to strengthen their competence to perform optimal NB HS NPD.

14.1.14 NB HS NPD and the Management of PD

PUL and PUM

The research project stressed the difference between PUL and PUM. During the research project I learned that there are significant possibilities of moving the product development activities of a number of the businesses from the top to the bottom of the product development model and process or even outside the formal product development model. When 85% of the general product development activities are incremental, there is a need to analyse the possibility of "pressing" the incremental product development activities out of the top of the product development model and nearer to the market. This is shown in Figure 14.7.

The optimal carrying out of PUL and PUM presupposes that strategic and tactical limits are set for the business's product development activities. This would give the businesses a possibility to carry out "on the market product

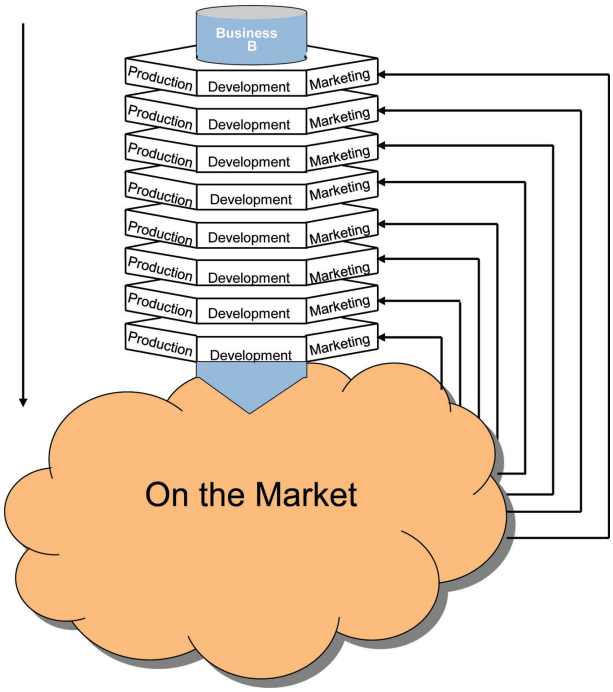

Figure 14.7 Pressure on incremental PD.

development activities". It also puts pressure on changing the management of product development.

The PUL level should focus on short term product development success criteria. Additionally, the PUM level should support them but should focus on the short term success criteria formulated according to and in line with the long term success criteria.

14.1.15 NB HS NPD Model

The research project showed that the NB HS NPD model was very much focused on the stage-gate model up 20 2003. It seems as if there were possibilities for SMEs in 2003 to use more flexible product development models when product developments were into radical, uncertain and risky areas. It was also verified in the research that businesses in the research today had the possibility of increasing the speed of PD by changing their models of PD and choosing among product development models in a more agile way. By doing so, the businesses could gain advantage of cost, speed time and performance.

Furthermore, the research showed that businesses in 2003 had the opportunity to simplify their product development models and processes, to speed their product development projects and to reduce the time to market. This observation was based on the fairly large percentage of product development projects that were placed in the incremental product development area. Many product development projects seemed in 2003 to be better off in terms of time and speed with a reduced or revised number of product development stages and gates. Some product development projects seem to be better off when not entering a formal product development process. This meant that they could easily be developing as "on the market product development".

Summing up on this issue verifies that businesses in 2003 were developing their new products at a too slow speed. It was possible to increase speed in PD much further.

However, the business must always ask the question – how much speed should the product development attend?

"On the market product development" demanded strong product development leadership and strong product development management as illustrated in Figure 14.8. This was and is still important to prevent the business from developing products in strategic and tactical bad areas.

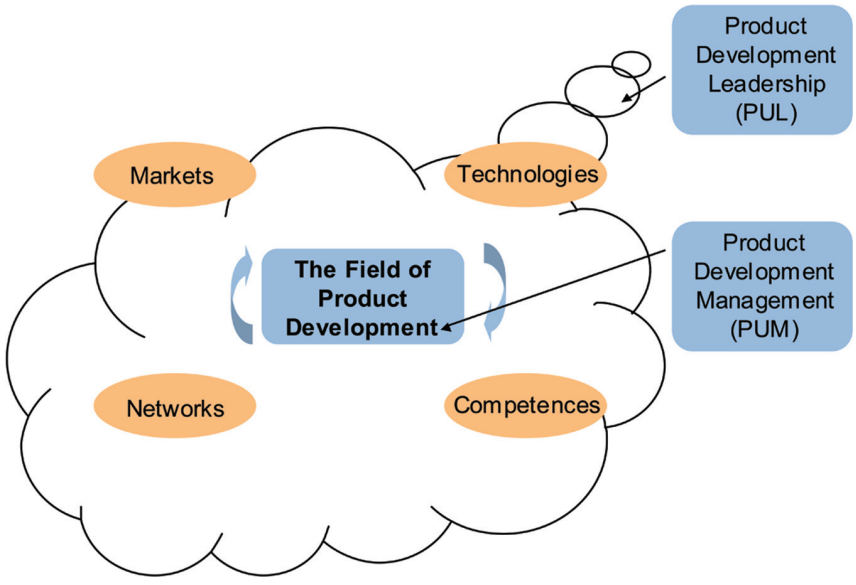

Figure 14.8 PD leadership and PD management.

In the cases of small businesses which did not have a tradition for strategic planning the product development activity was verified to use less formal product development models. Nevertheless, these businesses use product development models the structure of which look very much like a stage-gate model in structure. The time from idea phase to prototype phase was often quicker in small businesses as they did more direct prototyping. However, this activity had to be carefully steered and planned so that the product development process did not turn out to be a strategic failure to the business. However, this is the schism between innovation and motivation to idea generation. The business has to be continuously innovative and at the same time to plan and lead product development. This was proved to be a very difficult challenge to SMEs in 2003.

14.1.16 HS Enablers in Overall Perspective

The use of HS enablers to speed product development seemed to be important up to 2003. Although the knowledge of the use of HS enablers seemed to be more important. A further research should help to understand and give guidelines on how to use the HS enablers. However, some learning had been observed during the research especially on the individual HS enablers.

ICT Enabler

Quite surprisingly the ICT HS enabler turned out to be a rather poorly used enabler to speed product development in the businesses tested in the empirical part of the research.

Customer Enabler

In nearly all businesses the customer enabler was used as a high speed enabler. However, the research shows that there is more potential to the use of the customer enabler. Most businesses had their customers joining the very initial part of the product development process but it seemed as if many businesses still have an inside out perspective to product development.

PU Model Enabler

In nearly all businesses the PU model enabler was claimed to be used very much as an enabler to high speed. The use of this enabler was highly focused on the optimization of existing stage-gate models both overall and fragmented in one or two particular stages or gates.

A more agile and flexible use of the product development model enabler could in some cases speed the product development more than was the case up to 2003 especially in the case of radical product development.

Network Enabler

The research showed that the network enabler left major opportunities for improvement in future. The SMEs did not use the enabler very much today; they are left with major opportunities to increase network cooperation in product development. This could result in higher speed, lower costs and better performance in product development.

Innovation Enabler

Innovation was often seen as a "stop and go process". The innovation enabler was therefore considered and used very little when reflecting on high speed product development. By including innovation and continuous innovation in all phases of the product development process, the ability to speed product development will increase. The businesses which could absorb, develop and improve new products in this way were expected continuously to be able to increase their competitive advantage.

HRM Enabler

The research showed that the HRM enabler was very little or not at all in focus in the businesses. The expectation was that this enabler will become more in focus in the future after 2003. The HRM enabler will be a major tool to increase, develop and overview the network competences both internally in and externally of the business.

Process Enabler

The process enabler was used in very few businesses. It was my prediction that the process enabler would be used much more in future after 2003.

Product to Process Enabler

The product to process enabler was very much concentrated on a completely new way of understanding the product and the product development process. When businesses begin to work with the product as a process with no beginning

and no end, then product development was continuously going on, and the product was continuously developing.

Modularisation Enabler

The modularisation enabler was very important and very much used in businesses to speed product development. However, together with other research carried out at the CIP Centre in 2003 my research showed that the effort and results of modularisation seen in a high speed product development perspective have until 2003 been very poor.

The reason for this must be seen as a result of:

1. fragmented use of the modularisation enabler
2. lack of PUL when using the modularisation enabler
3. the misunderstanding that modularisation is always the answer to high speed product development
4. businesses' failure to use the modularisation enabler together with the product architecture
5. the delayed introduction of the modularisation enabler in the product development process

E-development Enabler

When the product or the process can be kept "floating" until the very last minute before the product is introduced to the market, then the business has a competence which is very important seen in a competitive way.

Extra Enablers Found in Research

During the research I found two new HS enablers that were not registered in the secondary case research. The management enabler seemed to be of very big importance to high speed product development; especially in the cases where top-managers place them self in the product development group or network. By doing this, top managers showed that the product development project had significant, strategic importance which normally motivated the network partners to do their utmost. At the same time it was possible to speed the product development process because the manager was able to make decisions right away in the project and when needed.

The second extra enabler which was verified in the research was the informal product development model enabler. This enabler turned out to exist

in almost every business. The enabler was used in many different ways to speed product development. This was subject for further research after 2003.

14.1.17 Learning Perspectives for Me as PhD Student

The learning perspectives of a PhD study are enormous. I am very grateful to those who gave me the opportunity to join the PhD study and to those – both friends and colleges – who supported me throughout the process.

In this paragraph I will stress the main learning issues of my PhD study. Such learning issues can be classified as follows:

1. Doing research
2. Writing articles
3. Working with research partners
4. Working close to the industry

14.1.18 Proposals for Future Research in General at the Centre of Industrial Production

On the basis of this research project the following further research activities have been initiated or are under preparation:

TOM Project

During my stay at Polytecnico di Milano I agreed to do a joint research together with researchers in the TOM project. The objectives of the project were to do research on knowledge management and knowledge transfer in NB HS NPD. At this point in time, the research plan has been agreed upon and we are now trying to formulated the questionnaire. The research toke place in Italy, Germany and Denmark.

E-PUIN – E-development Project – a National PD Research Project

One of the interesting HS enablers to product development in networks is the e-development enabler. At the CIP Centre we carried out a research project focusing on e-development in network based product development. Four different Danish counties were invited to join the project. Each of these counties came up with 6–8 SMEs and carry out a joint research together with the SMEs.

Research on New NB PD Models

At the CIP Centre proposed to complete a research on new network based product development models. This was carried out with major European researchers and SMEs forming a European network under the EU 6th Framework Programme. Danish Industry (DI) was the contractor of this new research project which formed the basis for future competitive advantage to European SMEs.

The project was a joint research cooperation with highly esteemed universities in Europe, industrial organisations and first class SMEs who all focus on this subject.

New Journal Article on E-development

One article for a journal on E-development was developed in Spring 2003 in cooperation with research network partners who I had met during the research project.

New Journal Article on Right Speed, Right Performance and Right Costs in NB HS NPD

One article for a journal on right speed in network based product development was drawn up in Spring 2003 in cooperation with research network partners who had met during the research project.